

*Citation for published version:*

Holden, A & Blondel, P 2015, 'Seabed and Sediment Acoustics: Measurements and Modelling Conference', *Acoustics Bulletin*, vol. 40, no. 6, pp. 6-8.

*Publication date:*  
2015

*Document Version*  
Publisher's PDF, also known as Version of record

[Link to publication](#)

**University of Bath**

**Alternative formats**

If you require this document in an alternative format, please contact:  
[openaccess@bath.ac.uk](mailto:openaccess@bath.ac.uk)

**General rights**

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

**Take down policy**

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

# Seabed and Sediment Acoustics: Measurements and Modelling conference

By Andrew Holden and Philippe Blondel

The Underwater Acoustics Group organised the international conference *Seabed and Sediment Acoustics: Measurements and Modelling*, held at the University of Bath on 7-9 September. The scientific objectives were to bring together international experts and scientists from all around the world, encouraging greater networking, the strengthening of existing ties between international groups (most often in North America and Europe) and the initiating of future collaborations. The technical objective was to share the latest advances in seabed and sediment acoustics.

This conference was scheduled for 2015 in order to coincide with the 10<sup>th</sup> anniversary of the successful international conference *Boundary Influences in High Frequency, Shallow Water Acoustics*, organised by Nick Pace and Philippe Blondel in July 2005, also at the University of Bath. Just over 10 years before, in April 1993, the university had the privilege of hosting another Institute of Acoustics conference, *Acoustic Classification and Mapping of the Seabed*, organised by Nick Pace and Nick Langhorne (then at the Defence Research Agency). This followed the 1983 conference *Acoustics and the Sea Bed*, spearheaded by Nick Pace, which was the first large, international conference of its kind to be held at the university. All these conferences were very successful, due in no small part to the activity of their organisers and the high calibre of all contributions with 51 papers published in 1983; 52 papers in 1993; and 65 papers in 2005. A total of 54 high quality papers were presented at the 2015 conference and there were 80 plus attendees each day. *Omnia mutantur, nihil interit* (Everything changes, nothing perishes. Ovid, *Metamorphoses*). This year's conference highlighted the many changes in the field over the last decade.

For the first time, this conference had a Young Scientists' icebreaker, an informal networking event attended by around 20 people and lasting well into the (late) evening. A few delegates had also attended the 1983 and 1993 conferences, and it was a pleasure to see the interaction between generations, and between

all attendees in general. The 1983 conference has long been remembered for its science, and for its social opportunities, and we aimed to preserve this spirit in the 2015 edition, with ample time for discussions at breaks in an otherwise very full programme, an icebreaker BBQ (on the lawn of The Edge, the brand new university building, with a beautiful sunset) and a conference dinner at the Roman Baths (lit by torches as the night set in).

The 2015 conference was the result of 18 months of planning by the organising committee: Philippe Blondel (University of Bath), Andrew Holden (Dstl), Linda Canty (IOA), Charles Holland (Penn State University), Gary Heald (Dstl) and Peter Thorne (NOCS). It benefited from the IOA experience in organising successful conferences, and attracted support from the Office of Naval Research Global, the Acoustical Society of America and the European Acoustical Association. The profiles of attendees covered large parts of the world (Fig. 1), with European attendees coming in equal parts from the UK and from our neighbours, and with a good spread of backgrounds (Fig. 2).

The single-track organisation had been favoured in previous Bath conferences. As several previous delegates put it: "It forces us to discover new things, and gives us new ideas". Around three full days, the following sessions were organised:

## Sediment acoustics

Twelve papers were presented in two sessions, chaired respectively by Gary Heald and David Barclay (Dalhousie University, Canada). New instrumentation was presented along with results from around the world, including a welcome attempt at synthesis and highlighting of data collection priorities. The papers covered topics such as the acoustic properties of deep sediments, the gas bubble distribution in sediments and sensing seabed interface wave vibrations and sediment.

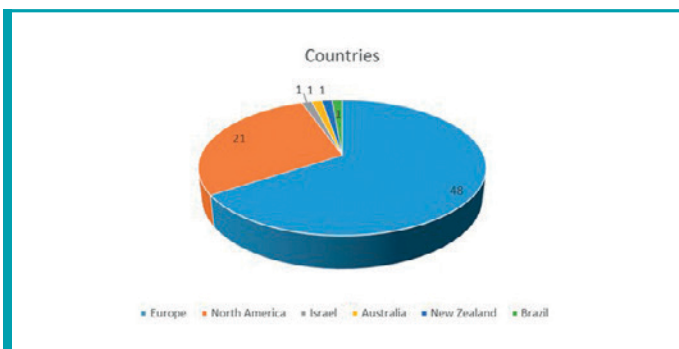


Figure 1. Most attendees to Seabed and Sediment Acoustics 2015 came from Europe and North America

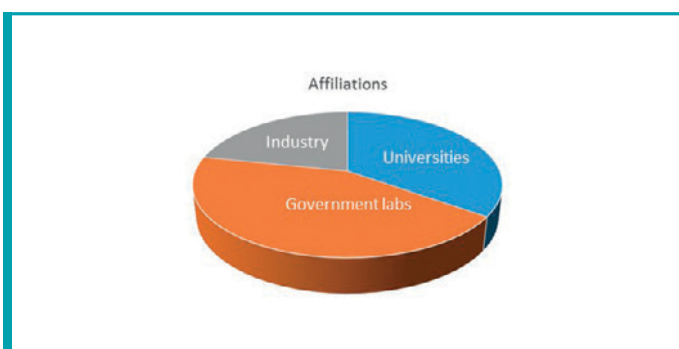


Figure 2. Delegates to the conference covered a wide spectrum of primary affiliations.



Nick Pace with a goblet to commemorate his work

## Acoustic scattering from the seabed

Ten papers were presented in two sessions, chaired respectively by Brian Hefner (UW, USA) and Charles Holland. Field measurements, repeated observations in natural habitats (e.g. Kwint Bank in Belgium) and high-level models were complemented by summaries of current calibration efforts of field instrumentation, showing the strong links between manufacturers and end users. Other papers looked at the scattering from shells, and assessing seabed ripple geometry.

## Seabed influence on acoustic propagation

Michael Taroudakis (University of Crete, Greece) chaired this session, with five papers covering theoretical developments of the seabed influence on propagation modelling, the effects of seabed scattering on acoustic propagation, as well as applications in complex environments (e.g. Lake Kinneret in Israel).

## Geoacoustic inversion

The next session focused on the latest acoustical processing and measurement techniques to extract information from the seabed and the water column using, in particular, signals of opportunity and impulsive sources. With five papers, this session was chaired by Adrian Jones (DSTO, Australia).

## Nick Pace's contribution to seabed acoustics

A special session (see page 8) was organised to recognise the special contribution that Professor Emeritus Nick Pace (University of Bath, UK) has brought to the international underwater acoustics community in close to 50 years. Chaired by former student and long-time collaborator Jacques Guigné (visiting professor in Bath and CEO of Acoustic Zoom, Canada), this session heard a summary of Nick's research, from a first paper in *Nature* in 1967 to the latest paper in 2015, as well as many patents and earlier services to the IOA. It was nicely complemented by former students, with stories of research and personal help they got from Nick, enabling them to start very successful careers.

## Synthetic aperture sonar

Alan Hunter (University of Bath) had organised this session, with six papers covering the latest developments in processing, using

tools such as temporal coherence or lacunarity, estimating seafloor heights with side-looking sonars, and presenting stunning, very high-resolution images of targets on the seabed.

## Bio and the seafloor

For want of a better name, this session aimed to present the bioacoustics research most relevant to seabed and sediment acoustics. Convened by Steve Simpson (University of Exeter, UK), this session was made up of three papers showing the effects of bioturbation, as well as the sensitivity of macroinvertebrates to substrate borne vibration.

## Habitat mapping

This short session carried on the theme of "acoustic scattering", and it was chaired by Marc Roche (FPS Economy, Belgium). Two papers presented the best practice and recommendations from the GeoHab international community, summarising several years of effort by a large international consortium, and the application of seabed acoustics to geo-hazards offshore Malta.

## Sediment transport

This last session contained six papers and was chaired by Alex Hay (Dalhousie University, Canada). Most papers showed measurements on and in the seabed, and mainly in the surf zone on beaches, highlighting how acoustics was measuring the movement of the sediment and how this was benefiting oceanography and beach management in particular.

## AB Wood Medal

The AB Wood Medal and prize was presented to Ying-Tsong ("YT") Lin, of Woods Hole Oceanographic Institution (USA) by the IOA President, William Egan, and the citation was read by Peter Dobbins (Ultra Electronics, UK), chairman of the Underwater Acoustics Group. YT then gave a talk highlighting some of the fascinating work he has conducted over the years, and the challenges in balancing experiments all over the world with breaking-edge models and also a full home life. See page 16 for full details.

As mentioned earlier, several social events were organised at key stages in the conference:

P8 ▶



Dr David Barclay



Dr Louise Roberts



Colleagues reunited: left to right: Dr Charles Holland, Dr Philippe Blondel, Professor Jacques Guigné, Professor Nick Pace, Dr Tony Lyons, Dr Nicholas Chotiros and Dr Gary Heald



P7

## Icebreaker BBQ

This was held on the warm and sunny Sunday evening before the conference and was attended by around 50 delegates who enjoyed the BBQ and drinks provided by the University of Bath. This coincided with one of the stages of a cycling Tour of Britain, and the samba band at the end of the road provided an appreciated musical background to the beginnings of this informal event.

## Young scientists' icebreaker

This was held at one of the University's newest restaurants. There were around 20 delegates evenly split between the young scientists and the "not so young" scientists. Discussions lasted for several hours, well into the starry night, and the event was very much appreciated by all.

## Conference dinner at the Roman Baths

Eighty delegates enjoyed the unique atmosphere and surroundings of the Roman Baths, a UNESCO World Heritage attraction. A drinks reception allowed the delegates to wander (and wonder) around the Baths before a sit-down meal in the restaurant overlooking the Baths. Mementoes of the conference were handed out to the session chairs and Linda Canty received a bouquet of flowers in appreciation of all the hard work she did behind the scenes before the conference.

## Conference feedback

At the end of the conference, the organisers received many comments both verbally and by email from delegates saying how they really appreciated and enjoyed both the conference presentations and the social events. This conference already owes its success to the high number, and the very high research level, of the presentations and papers submitted. A more formal feedback process is taking place over the next weeks, using the standard IOA procedure, and its results will be analysed at the next Underwater Acoustics Group committee meeting to plan for future conferences.



Dr Roy Edgar Hansen (left) and Dr Nicholas Chotiros study some data during a break

## Conference proceedings

The abstracts of the Conference Proceedings will shortly be available on the University of Bath's OPUS open-access research repository (<http://opus.bath.ac.uk/>; search for Seabed and Sediment Acoustics 2015). The full proceedings can be bought from the IOA making sure the excellent research presented at the conference remains accessible to all for the years to come.

## Future

Bath 2025 is already being pencilled in! But between now and then, there will no doubt be other good seabed and underwater acoustics sessions at various conferences over the world, as well as dedicated IOA conferences (all to be advertised in *Acoustics Bulletin*, of course).

## A tribute to Nick Pace: Acoustics backscatter, imaging and classification on the sea floor

A special tribute was paid to Professor Nick Pace for his distinguished contribution to the field of underwater acoustics in a career spanning 45 years.

The following citation was read by Gary Heald during a special session to mark his work.

Professor Nicholas G Pace was awarded his PhD from Durham University in 1970 for his research entitled Ultrasonic propagation and binding in solids. Shortly after this he started his long career in the Department of Physics at the University of Bath. He has conducted research and development in many areas of acoustics and sonar applications. He is particularly well known for his research on the interaction of high frequency acoustics with the seabed. This has been applied in mine countermeasure applications and for the measurement, classification and mapping of seabed sediments. His research encompasses a wide range of topics including propagation of sound in shallow water and fluctuations in the ocean. He has worked on many types of sonar, including echo sounders, sidescan sonar, multibeam echo sounders and parametric sonars. In more recent years his research has included developments in synthetic aperture sonar, which offers high-resolution sidescan images from the seabed, provided the variability can be compensated, and bistatic sonar.

He is widely published in many international journals and has many conference papers in the open literature. His work is frequently cited in others papers and he holds a number of patents, particularly from his collaboration with his former student, Jacques Guigné. In 1983 he organised and chaired

the first in the series of Institute of Acoustics conferences on seabed and sediment acoustics and many of the papers from that conference are frequently cited. This has been followed by the seabed conferences, held at the University of Bath in 1993, 2005 and now this conference in 2015. He is a Fellow of the Acoustical Society of America. He was an active member of the IOA underwater acoustics group committee for many years.

During his years at the University of Bath he was frequently called upon to conduct research for the Admiralty Scientific branches of the MoD (AUWE, ARE, DRA, DERA) where he was well known and highly respected. This research included many studies on various aspects of sediment acoustics, over a wide range of frequencies, but also included projects investigating shallow water acoustic propagation and bubble acoustics.

In the latter part of his career he was given leave of absence from the university to take up a position Saclantcen (now CMRE) in La Spezia, Italy. During his time at the NATO centre he led teams investigating environmental acoustics (modelling, experimentation and statistical analysis), mine countermeasure sonar, force protection and seafloor mapping. He and his team also developed techniques for accurate ground truthing, including stereo photography and CT scanning of core samples. He also hosted many international scientists at the centre, as both visitors, as part of joint collaboration programmes and at the international conferences held in Lerici.

Professor Pace is now an Emeritus Professor at the University of Bath. The international underwater acoustics community, his colleagues and former students (many of whom still work the field of acoustics) are indebted to him for his excellent contribution, guidance and leadership. ■